be called exhaustive, and it is almost inevitable that some parts of so wide a subject should be dealt with in greater detail than others of equal importance. But the book is a useful storehouse of facts, selected with discretion, arranged with judgment, and pleasantly recounted.

F. A. D.

THE MINERAL INDUSTRY OF CANADA.[1]

THE Department of Mines of Canada is doing excellent work in distributing information concerning the mineral wealth of the Dominion by means of publications that appeal both to the trained expert and to the seeker after general information. A good example of the latter form may be found in a pamphlet of some seventy-seven pages entitled "Economic Minerals and Mining Industries of Canada," written by the "Staff of the Mines Branch," which gives in clear and convenient form a brief review of the occurrences and distribution of all the economic mineral products of the Dominion of Canada, together with indications of the legislative enactments that control the tenure of mineral property, the latter being especially important, seeing that each province has its own mining laws. This popular description, which, though brief, is clear and easily intelligible to anyone interested in mining matters, should prove of the utmost value to prospectors or others who may be going to Canada and are anxious to acquire some general knowledge of the more important economic minerals that are found in Canada, of the districts in which they chiefly occur, and the conditions under which their occurrence may be looked for with the greatest probability of success.

No better example of the opposite extreme, that is to say, of publications written essentially for the trained mining or metallurgical engineer, can be quoted than the monograph on the nickel industry of Sudbury by Dr. A. P. Coleman, a work of some 200 pages, in which a full account is given of these important mineral deposits. The general geology of the region is first described in much detail, then descriptions of the various minerals met with and of typical forms of the ore deposits themselves, all of these being very careful and apparently very accurate. Dr. Coleman discusses the mode of formation of the deposits, and seems inclined to adopt the magmatic segregation theory in its simplest and most definite form; he certainly mentions the researches of Dr. Campbell and others which have shown that there is very much to be said in favour of the aqueous origin of the ores, but Dr. Coleman apparently lays but little stress on these. He does not appear to have considered the possibility that these conflicting views might be reconciled on the hypothesis that the ores might have been formed by some form of hydrothermal process, in which separation from a cooling magma in the presence of water in some form or other under conditions of intense pressure may have produced the phenomena that characterise these ore deposits. Detailed descriptions of the various mines are given, together with some account of the method of mining and an outline of the smelting processes in use. The value of the monograph is enhanced by a comparison of the nickel occurrences at Sudbury with the remaining most important sources of nickel in the world.

The Annual Report on the Mineral Production of Canada is a volume that interests both the specialist and the seeker after general information, though it must be admitted that it appears to cater for the latter rather than for the former class of reader, there being throughout evidence of a desire to make the figures, especially the value of the mineral production of Canada, look as large as possible. No doubt the pernicious example of its neighbour, the United States, has much to do with this striving after inflated figures. The unfortunate result is that the figures given in the report are not the real value of the mineral production of the Dominion, as several items appear more than once. Thus in the report on the mineral production for 1911 the grand total of the value of the mineral production is given as 103,220,994 dollars; this is made up of metallic products, 46,105,423 dollars, non-metallic products (in which are included such items as arsenious oxide, chromite, manganese, ochres, pyrites!), 34,405,960 dollars, and structural materials and clay products, 22,709,611 dollars. Amongst the so-called non-metallic mineral products, by far the most important is coal, the value of which is given as 26,467,646 dollars, or about 77 per cent. of the whole; a very large proportion of this coal is, however, used in smelting the metals which are included in the first-named group and in burning the Portland cement, bricks, tiles, and other ceramic goods, and the lime included in the last-named group. As the value of all these products depends in part, often in quite considerable part, upon the fuel used in their production, the value of the coal appears twice over in the above grand total. Furthermore, very large quantities of coal and coke are imported into Canada, their value in 1911 exceeding 41,000,000 dollars, and it is certain that a very large proportion of this imported fuel is also used in manufacturing the metallic and other products above referred to, so that the value assigned to these includes in no small part the value of the imports of coal, etc. In spite of these facts, which show that the value of the mineral products of

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[1] "The Nickel Industry: with Special Reference to the Sudbury Region, Ontario." By Dr. O. P. Coleman. (Ottawa: Government Printing Bureau, 1913.)

"Annual Report on the Mineral Production of Canada during the Calendar Year 1911." By John McLeish, Chief of the Division of Mineral Resources and Statistics. (Ottawa: Government Printing Bureau, 1913.)

"Economic Minerals and Mining Industries of Canada." By the Staff of the Mines Branch. (Ottawa: Government Printing Bureau, 1913.)

"A General Summary of the Mineral Production of Canada during the Calendar Year 1912." By John McLeish (Ottawa: Government Printing Bureau, 1913.)

"The Production of Copper, Gold, Lead, Nickel, Silver, Zinc, and other Metals in Canada during the Calendar Year 1912." By Cosmo T. Cartwright. (Ottawa: Government Printing Bureau, 1913.)

"Summary Report of the Mines Branch of the Department of Mines for the Calendar Year ending December 31, 1912." (Ottawa, 1913.)

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Canada cannot be compared with the mineral statistics of other countries unless these causes of inflation are taken into account, it is obvious that the Canadian mining industry is flourishing, and forms an important item in the wealth-producing power of the Dominion.

Important as was the mineral production in 1911, it appears to have been quite eclipsed by that of 1912, for it may be taken for granted that the figures contained in the General Summary, just issued, are not likely to be greatly modified in the final report. This gives the grand total of the entire mineral output, made up as it was in 1911, as 135,048,296 dollars, equal to an increase of 30·8 per cent. There is no new feature of any importance, except perhaps that the gold production shows an increase of about 40 per cent., due to the Porcupine district of Ontario. The silver output has fallen off slightly in Cobalt, but all other metals show an increased production. By far the most important mineral product is still coal, and as its output has increased by 28 per cent., this alone would cause the year to compare favourably with its predecessor. All that can fairly be said is that the 1912 report shows clearly that the mineral production of Canada is steadily growing in importance.

It is to be regretted that the scheme of Canadian mineral statistics takes no account of the labour conditions of the industry, and that no information is given concerning the number of men engaged in the industry, the wages earned by them, and of the accidents, fatal or non-fatal, that have befallen them during the year. Statistics on these points ought to be forthcoming in order to enable students of the subject to form a clearer picture of the course of development of the mineral industry of the Dominion.

The Report upon the production of the various metals in Canada may be taken as a final report, whilst it at the same time goes into somewhat greater detail than is possible in the General Summary, and also devotes more especial attention to the economic side of the subject. It can only be said fully to confirm the impression given by the General Summary as to the flourishing condition of the Canadian mineral industry.

The Summary Report of the work performed by the Mines Branch of the Department of Mines forms most interesting reading, and indicates that the Mines Branch is carrying out a vast amount of research work for the benefit of the mineral industry of the Dominion. A report upon the metallurgy of cobalt and its alloys, and another upon recent progress in the electrical manufacture of iron and steel may be named as indicating the nature of the work being carried on; it is most satisfactory to find evidence of the existence of a Government Department equipped for conducting such researches upon modern scientific lines, and to have such proof that the Canadian Government is far-seeing enough to give such excellent assistance to an important industry. It may fairly be said that if Canadian mineral industries are flourishing, the result is due not only to the great resources of the Dominion, but to the enlightened policy of a Government which devotes its energies to turning these resources to the best possible account.

IMPROVEMENTS IN THE BINOCULAR MICROSCOPE.

MICROSCOPISTS long ago appreciated the advantages that might accrue could *both* eyes be employed to view the object by means of a "binocular" microscope—the natural method of viewing objects with both eyes would be preserved and eye-strain lessened, and stereoscopic vision may be attained.

The viewing of an object with both eyes not only lessens eye-strain, but there is a summation of stimuli in binocular vision, and, even without a stereoscopic effect, a better appreciation of the object viewed is probably obtained—there is greater "vividity" about the image.

Three principles have now been applied in the construction of the binocular microscope. The first of these is the use of two complete microscopes pointed obliquely at the same object, as in the Greenough binocular. This form has but a limited application as it is adapted for low-power work only. In the second form, best represented by the "Wenham" binocular and its modifications, the light coming from a single objective is "geometrically" divided, *i.e.*, the beam is bisected and half is directed into each eye. This is accomplished by interposing one or more prisms in the path of the beam as shown in Fig. 1.

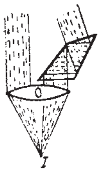

FIG. 1.

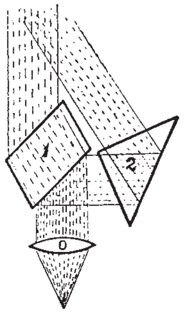

FIG. 2.

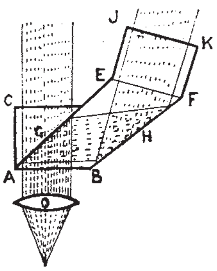

FIG. 3.

This type of instrument involves the use of long tubes and is consequently bulky, resolution is diminished by reducing the size of the beam of light, and it cannot be used with high powers as the dividing prism cannot be placed sufficiently close to the back lens of the objective properly to bisect the beam before the rays have intermingled.

The third form alone embodies correct principles. In this, of which the Powell and Lealand and Abbé are the best examples, the beam of light is not bisected, but is physically sifted or filtered, so that a portion of every part of it goes to each eye. This "sifting" or "filtering" is accomplished in the forms mentioned by interposing in

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